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SANITATION OF LOOSE CELLS INCORPORATED INTO AN INCUBATION SYSTEM

If loose cells are to be dipped for chalkbrood sanitation, they may be slowly brought out of cold storage beginning roughly 25 days prior to an anticipated 15-20% bloom in the seed field. This dipping procedure may be incorporated into the incubation schedule if an extra day or two is allowed for drying time. One should gradually (over three to four days) bring cold storage temperatures from 35-40°F to the ambient air temperature that will be present during dipping. Ideally, this temperature would be 80-35°F, but the procedure may be done outside if temperatures are not too extreme.

After bees have adjusted to ambient temperatures, cells may be dipped in a 50-100% (25,000 to 50,000 ppm free chlorine) household bleach solution (NaOCl, sodium hypochlorite) for three minutes with no ill effects to developing larvae. Granular swimming pool bleach (CaOCl, calcium hypochlorite) has also been used effectively as a source of free chlorine in 1.5% solutions. Antoher type of granular swimming pool bleach containing stabilized dry chlorine (sodium dichloro-s-triazinetrione dihydrate) appears to be the most effective chlorine material available to date. There is no

residue problem as found with calcium hypochlorite and it is much less expensive than household bleach. With an active ingredient concentration of 62%, 20.85 lbs. of meterial in 100 gallons of tap or well water yields a 1.5% concentration which has provem to be very effective under lab conditions (Stephen, W.P, et.al., 1981). This material has also been used by a number of growers with no ill effects to developing bee larvae.

More recently, iodine solutions in concentrations of .3 to .5% as free iodine in potassium iodine (I and KI) have been used. The material is a 5% free iodine in strong iodine solution (Lugols' Solution). This solution has proven sporicidal in the lab though it has not been tested on loose cells in the field. There have been problems in finding a commercial source for Loguls' Solution, and at higher concentrations it has been shown to be toxic to bees that have been treated in the adult stage.

Loose cells may be placed in a dipping basket with a lid. The basket can be made from 1/8" holes in a plastic bucket.

Place the basket with the cells into the solution for three minutes, no longer. Gently agitate the basket to displace entrapped air and insure that all surfaces come in contact with the solution.

After three minutes, remove the basket of bee cells from the solution and drain until all free water has drained from the container (one to two minutes).

After dipping, spread the drained bee cells about one inch thick on the surface of 1/8" mesh material to dry. Racks should be elevated so that air can circulate around them. Drying cells should be shaded, in a well-ventilated area away from direct sunlight or bee mortality will occur quickly. If the cells are to be immediately incubated which they should

since diapause may have been broken, it is unnecessary to completely dry the cells before placing them in incubator trays. However, they should be dried to a point where "caking" or bonding of cells together does not occur, since molding may be the result.

Empty styrofoam laminates can be disinfected by dipping in a 3.0% chlorine solution. With a 65% concentration of active ingredients, 41.70 pounds of chlorine material in 100 gallons of tap water gives the desired 3.0% solution. Adjusting the PH of chlorine solutions increases health hazards from muratic acid and is unnecessary. Laminates should be removed from their container and placed in a dipping basket or bound to keep them from separating while being dipped.

Wood laminates can be dipped if they are removed from their container and bound in such a manner that they cannot warp upon drying.

The disinfecting solution that remains after dipping cells can also be used for treating bee domiciles. The solution should be sprayed on the inside and outside of empty domiciles. Spray the walls and floor until the solution runs off to insure good coverage.

Prior to spraying the solution, the concentration of free chlorine may need to be increased with the addition of more active ingredients. A handy tool which can be purchased from many swimming pool dealers is a bleach concentration test kit. This enables one to determine to the nearest 0.5% what the free chlorine concentration in the solution actually is by a color change reaction. If a person cannot obtain a kit locally, one can be ordered from Taylor Chemical Co., Inc., 7300 York Road, Baltimore, MD 21204.

After dipping and drying, cells may be placed in trays to that they are no deeper than two inches to reduce mortality during emergence. The

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trays should be of dimensions enabling a 1 to 1½ inch clearance between the cells and the covering screen to allow room for emerging bees. Screens need not be placed over trays until the first signs of male bee emergence which is generally not until the 14th or 15th day of the incubation period. The first 24 hour period at 85°F in the incubator will define day 1.

For further information contact Dale W. Lundahl, Department of Agriculture, Plant Industry Division, Capitol Station, Helena, Montana 59620-0201. Phone: 444-3730

Literature Cited

Stephen, W. P. et.al., 1982. Inhibition of Chalkbrood Spore Germination *in vitro*. Ag. Exp. Sta. Bull. No. 656 pp 5-13.